

REMARKS

The Office Action mailed December 1, 2005, has been received and reviewed. Claims 1-21 are currently pending in the application. Claims 1-8, 11, 15-17, 19 and 21 stand rejected. Claims 9, 10, 18 and 20 have been objected to as being dependent upon rejected base claims, but the indication of allowable subject matter in such claims is noted with appreciation. Claims 12-14 have been allowed. Applicants have amended claims 1, 7-10, 12, 13, 15, 16, 18 and 19 to replace the term "said" with the equivalent term "the." Hence, the scope of the claims remains undiminished. Claim 1 also includes a further amendment. Reconsideration is respectfully requested.

Objection to Specification

The disclosure stands objected to because it recites "The dielectrics include, but are not limited to, oxides, nitrides, carbides, carbon nitrides, oxynitrides, doped or slightly doped monocrystalline or polycrystalline silicon, and their equivalents." The Examiner stated that doped or slightly doped monocrystalline or polycrystalline silicon are not dielectrics. Applicants respectfully submit that, for example, oxygen doped polysilicon may be a semi-insulating material. *See e.g.*, U.S. Patent 4,901,133 col. 6, lines 17-19. A copy of U.S. Patent 4,901,133 is provided herewith. Reconsideration and withdrawal of the objection is requested.

35 U.S.C. § 112 Claim Rejections

Claims 6 and 21 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

Specifically, claims 6 and 21 recite that the "insulation layer comprises a material selected from the group consisting of oxides, nitrides, carbides, carbon nitrides, oxynitrides, doped monocrystalline or doped polycrystalline silicon." The Examiner stated that doped monocrystalline or doped polycrystalline silicon are not insulative materials. Applicants respectfully submit that, for example, oxygen doped polysilicon may be a semi-insulating

material. *See e.g.*, U.S. Patent 4,901,133 col. 6, lines 17-19. A copy of U.S. Patent 4,901,133 is provided herewith. Reconsideration and withdrawal of the rejection is requested.

Double Patenting Rejection Based on U.S. Patent No. 6,593,657 B1

Claims 15-17, 19 and 21 stand rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-4 of U.S. Patent No. 6,593,657 B1. In order to avoid further expenses and time delay, Applicants elect to expedite the prosecution of the present application by filing a terminal disclaimer to obviate the double patenting rejections in compliance with 37 CFR §1.321 (b) and (c). Applicants' filing of the terminal disclaimer should not be construed as acquiescence in the Examiner's obviousness-type double patenting rejection(s). Attached is the terminal disclaimer and accompanying fee.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 5,355,020 to Lee et al.

Claims 1-6 and 11 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Lee et al. (U.S. Patent No. 5,355,020). Applicants respectfully traverse this rejection, as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Lee discloses a method of forming a wiring layer comprising providing an insulating layer 32 over a semiconductor substrate 31. A contact hole 33 is included in the insulating layer 32 which exposes a portion of the semiconductor substrate 31. A diffusion barrier layer 34 (Ti or TiN) is deposited over the insulating layer 32 and onto the portion of the semiconductor substrate 31 exposed through the contact hole 33. (*See, e.g.*, Lee, FIG. 12.) The diffusion layer 34 may also comprise multiple metal layers. (Lee, col. 14, line 39-col. 15, line 7.) Thereafter, a first metal layer 35 and second metal layer 36 are deposited to partially fill the

contact hole 33. (Lee, FIG. 12.) The first metal layer 35 comprises an aluminum alloy including a silicon component and the second metal layer 36 is aluminum or aluminum alloy. The first and second metal layers are heat-treated to facilitate filling the contact hole 33 above diffusion layer 34. (Lee, col. 15, lines 30-42.)

Another metal layer 38 is deposited thereover and heat-treated. "Performing this step enables the atoms of the metal layer to migrate into opening 33, thereby filling it more completely to result in a wholly planarized wiring layer." (Lee, col. 16, lines 6-15.)

By way of contrast with Lee, claim 1 of the presently claimed invention recites a "method for forming a contact electrically connected to a metal line, comprising: forming an insulation layer situated on a semiconductor substrate; forming a contact hole in the insulation layer to expose a contact surface on the semiconductor substrate; and forming a single layer of metal having a substantially planar top surface upon a top planar surface of the insulation layer, the single layer of metal substantially filling the contact hole and in contact with the contact surface on the semiconductor substrate." Applicants respectfully submit that Lee fails to disclose each and every element of claim 1 of the presently claimed invention.

Specifically, Lee fails to disclose, either expressly or inherently, "forming a single layer of metal having a substantially planar top surface upon a top planar surface of the insulation layer, the single layer of metal substantially filling the contact hole and in contact with the contact surface on the semiconductor substrate." First, layer 37 of Lee is a composite layer, not a "single layer of metal" as recited in claim 1. (Lee, col. 15, lines 7-51; FIG. 13.) Second, the metal layer 37 of Lee clearly does not include "a substantially planar top surface upon a top planar surface of the insulation layer" as recited by claim 1. As seen in FIGs. 12-17, the metal layer 37 is "Y" shaped. Further, that the heat treatment of layer 38 planarizes the surface does not mean that metal layer 37 is also planarized. Metal layer 37 is made by depositing two different layer of metal (aluminum alloy with silicon and aluminum) which only partially fill the contact hole 33. (Lee, FIG. 12.) Heat-treatment causes the two layers to fill the contact hole 33. (Lee, FIG. 13.) By contrast, the second conductive layer 38 is more substantially planar when initially deposited. (Lee, FIG. 14.) Further, conductive layer 38 is formed of metal that lacks silicon. Thus, one of skill the art would not expect layers 37 and 38 to react the same way upon

heating. Third, metal layer 37 of Lee is not in contact with the contact surface on the semiconductor substrate as recited by claim 1. Instead, the metal layer 37 is in contact with diffusion barrier layer 34. (FIG. 12.) As Lee fails to disclose, either expressly or inherently, every element of claim 1 of the presently claimed invention, Lee cannot anticipate claim 1. Thus, claim 1 is allowable.

Claims 2-6 and 11 are each allowable as depending from allowable claim 1.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,355,020 to Lee et al. in view of U.S. Patent No. 5,840,623 to Sahota

Claims 7 and 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Lee et al. (U.S. Patent No. 5,355,020) in view of Sahota (U.S. Patent No. 5,840,623). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added.)

The discussion of Lee above is incorporated herein. Sahota fails to cure the deficiencies of Lee. The nonobviousness of independent claim 1 precludes a rejection of claims 7 and 8 which depend therefrom because a dependent claim is obvious only if the independent claim from which it depends is obvious. See In re Fine, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), see also MPEP § 2143.03. Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to independent claim 1 and claim 7 and 8 which depend therefrom.

Objections to Claims/Allowable Subject Matter

Claims 9, 10, 18 and 20 stand objected to as being dependent upon rejected base claims, but are indicated to contain allowable subject matter and would be allowable if placed in appropriate independent form. Applicants appreciate the indication of allowability. However, applicants respectfully submit that the claims from which claims 9, 10, 18 and 20 depend are also allowable.

ENTRY OF AMENDMENTS

The amendments to the claims above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1-21 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Office determine that additional issues remain which might be resolved by a telephone conference, the Examiner respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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